ROCKY FLATS PLANT
OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY

# TECHNICAL REVIEW OF PROPOSED INTERIM MEASURES/INTERIM REMEDIAL ACTION PLAN AND DECISION DOCUMENT FOR THE 903 PAD, MOUND, AND EAST TRENCHES AREA

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region VIII Superfund Remedial Branch
Denver, Colorado 80202

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## 1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) requested that PRC Environmental Management, Inc. (PRC) review the "Proposed Interim Measures/Interim Remedial Action (IM/IRA) Plan and Decision Document for the 903 Pad, Mound, and East Trenches Areas" at Rocky Flats. The following review consists of specific comments that are keyed to the applicable section, page, and paragraph number of the document. PRC reviewed Tetra Tech Comments on the "Phase II Remedial Investigation Sampling Plan for 903 Pad, Mound, and East Trenches Areas" (RI Sampling Plan Comments) to obtain background information on the site. PRC performed this review under the Technical Enforcement Support XII contract, Work Assignment C08006.

## 2.0 SPECIFIC COMMENTS

<u>Section 2.3.1, Pages 2-23 through 2-59</u>. Section 2.3.1 should be viewed as a brief overview of existing data on ground-water contamination at Operable Unit 2 (OU2). Deficiencies in the ground-water monitoring program for OU2 were noted in the RI Sampling Plan Comments. These deficiencies have not been addressed nor has any part of the RI phase II sampling plan been implemented. There are significant distinctive gaps in the areal distribution of monitoring wells. Monitoring wells should be screened specifically for light and dense phases. The current array of monitoring wells is insufficient for determining plume geometry and distribution and source characterization. For example, the large gap between alluvial wells 15-87 and 44-87 is directly downgradient of the 903 Pad. The current well array is not likely to detect a plume migrating from the 903 Pad. However, in Section 2.3.2.1, conclusions are made about the extent of volatile organic and radionuclide contamination surrounding the 903 Pad.

<u>Section 2.3.1, Page 24, Paragraph 2</u>. This paragraph states that background ground-water chemistry data from wells 55-86 (alluvial) and 54-86 (bedrock) will be used to preliminarily determine which constituents in the ground water at OU2 are contaminants. Rockwell admits in the preceding paragraph that the data from these wells are insufficient for background characterization. The data are insufficient because only one data point is used to characterize the ground water in each unit. Furthermore, the background bedrock well is in a different stratigraphic unit than the bedrock at OU2. The background alluvial well is in a different type of geomorphic unit than the dominant geomorphic unit in the most contaminated areas of OU2. EPA stated in the RI Sampling Plan Comments that, due to the poor quality of existing information, analytical parameters must be selected based on known waste constituents and on an accurate definition of background concentrations. Background information may be obtained from the "Background Hydrogeochemical Monitoring Plan" for Rocky Flats. At the present time,

only one quarter of ground-water data on the site is available for review (2nd quarter, 1989). This background data may be preferable to data from wells 55-86 and 54-86 due to the spatial variability of the data and the similarity of the monitored units with those present in OU2.

Section 2.3.1, Pages 2-31 through 2-54. Tables 2-7 through 2-12 depict the averaging technique that Rockwell uses to reduce the ground-water chemistry data for use in the interim remedial action. There are several problems with this technique. For instance, the sample population of seven wells used to represent the 903 Pad alluvial wells (Table 2-1) includes one well that is upgradient from the source (64-86), two that are at least 1,500 feet from the source (29-87, 65-86), and one that is depicted in Figure 2-5 as a bedrock well (62-86). None of the remaining three wells are located directly downgradient of the source. Averaging data from these wells may give chemical concentrations that are not representative of the ground-water quality downgradient of the 903 Pad. Also, this technique does not place emphasis on maximum values. For instance, well 42-86 is well above the applicable or relevant and appropriate requirement (ARAR) for gross alpha (215 pCi/l) and gross beta (144 pCi/l). This well may be expected to produce 78 percent of the influent into the ground-water treatment system proposed in Alternative 1 of the IM/IRA alternatives.

Section 2.3.1 which describes the alluvium and bedrock ground-water chemistry of OU2, does not list instances in which samples taken from individual wells exceed the ARAR for radionuclides. Individual samples that exceed the ARAR should be reported in this section so that high values of radionuclides will be taken into account when designing and selecting the remedial alternatives.

Section 2.3.1.6, Page 2-59, Paragraph 5. This paragraph states that the maximum distance that contamination has traveled is 2,250 feet, based on hydraulic conductivity and gradient data. Rockwell uses a maximum calculated gradient of 0.09 ft./ft. but does not provide calculations or explain how the value was derived. Likewise, no reference is made to the actual hydraulic conductivity data that supports this statement. This statement does not specify from which point(s) this distance is measured or indicate the length of time since initial contamination.

Section 2.3.2, Page 2-60, Paragraph 1. The soil sampling data that is mentioned in this section does not appear in the text or the appendix of the IM/IRA plan, even though many of the conclusions and statements made in Section 2.3.2 are based on these data. These data should be provided along with an indication if whether the data was validated.

Section 2.3.2.1, Page 2-60, Paragraph 2. Rockwell does not present evidence supporting the contention that volatile organic contamination in the soil is limited to the pad at the 903 Drum Storage Site. The soil boring program is cited as providing data on the areal extent and vertical distribution of volatile organics and radionuclides, but the text and appendix do not present actual data. If such data exists and has been validated, it should be presented here, preferably as chemical concentration maps. The statement is made that "...because volatile organics are present in the ground water at these sites (903 Drum Storage and 903 Pad Lip), it is deduced that the extent of volatile organic soil contamination at the 903 Drum Storage Site is confined to the area immediately beneath and adjacent to the pad." The reasoning behind this deduction is not apparent.

Section 2.3.2.1, Page 2-60, Paragraph 3. Rockwell postulates that radionuclide contamination in soils in the vicinity of Trench T-2 originated from the 903 Drum Storage Site via wind dispersal. This opinion is based on a single surface to 9-foot depth composite sample taken from boring BH25-87. This interval is too large to make assumptions on the vertical distribution of contaminants. While standard split spoon sampling may be ineffective due to the coarse texture of the alluvium, alternative sampling techniques may provide data on the vertical distribution of radionuclides. Possibly a radiation detector may be lowered into the borehole to obtain a qualitative survey of radioactivity. This information could be useful in screening further sampling methods with respect to worker safety. Samples may be obtained by trenching. A trench may be dug by using a backhoe, then 6-inch to 1-foot samples may be collected from the trench wall at regular intervals in the alluvium.

Wind dispersal of radionuclide contaminated sediments from the 903 Pad site has also been postulated for samples obtained at Solid Waste Management Unit (SWMU) 140, adjacent to SWMU 108, and from sediment samples along Woman and Walnut Creeks. The SWMU samples were large composite samples similar to the composite sample from BH25-87. It is not clear how the sediment samples were obtained.

2.3.4, Page 2-66, Paragraph 1. Rockwell concludes that high plutonium and americium concentrations found in seeps southeast of the 903 Drum Storage Site represent particulate forms of the radionuclides originating from contaminated soils at the surface. This conclusion is based largely on the contention that "...the seeps represent surfacing ground water and ground water does not appear to be contaminated with radionuclides." However, it is well documented in Section 4.0 of the RI Sampling Plan Comments that the existing monitoring well network southeast of the 903 Pad is inadequate for characterizing the movement of ground water and contaminants through the alluvial aquifer.

Table 3-2-1, Pages 3-11 and 3-12. The IRA action plan states that "...the lowest human health or agricultural-based promulgated standard among the Safe Drinking Water Act, Maximum Contaminant Level, and the Colorado Department of Health (CDH) ground- and surface water standards is first applied." However, Table 3-2-1, Screening of Chemical Specific ARARs, uses concentration limits derived from Resource Conservation and Recovery Act (RCRA) Subpart F for tetrachlorethane and vinyl chloride even though they are significantly higher than the CDH ground-water quality standard promulgated in August 17, 1989. Rockwell states that the CDH standards for these constituents are below detection limits. Appendix 9 of 40 Code of Federal Regulations (CFR), Part 264 lists, the practical quantitation limits of tetrachloroethane as 0.5 $\mu$g/l and vinyl chloride as 2.0 $\mu$g/l, neither of which is above the CDH standard. Furthermore, the citation given in Table 3-2-1 for the Subpart F Concentration Limit (40 CFR, Past 261, Appendix 8, List of Hazardous Constituents) does not list or quantify detection limits.

Section 4.3, Page 4-3. Granular activated carbon (GAC) was the selected treatment technology for organics removal at OU2. Ultraviolet (UV)/peroxide treatment was not chosen because it was considered less flexible and effective than GAC in removing organics over a wide range of flow and concentration. Section 4.3 states that influent organic concentrations must be closely monitored to ensure adequate peroxide dosage and that reliable on-line dosage controls for variations in influent quality do not exist. However, reliable on-line dosage controls are available and can be implemented in this process. Furthermore, disadvantages of the GAC process have not been brought forth in the technology screening. According to the IM/IRA Plan to the 881 Hillside Area (Rockwell International, 1989), uranium will likely adsorb to the activated carbon, thereby requiring shipment of the radioactively contaminated carbon to the Nevada Test Site for disposal. For this reason UV/peroxide was the organic treatment technology chosen for use at the 881 Hillside Area, which has similar environmental and contaminant characteristics as OU2. Therefore, UV/peroxide should be further considered for implementation at OU2.

Section 4.3.1.1, Page 4-4. Section 4.3.1.1 states that periodic samples will be taken from the effluent of each GAC unit to determine if the lead unit needs to be replaced. How often sampling will occur should be specified.

Section 4.3.2.1, Page 4-7. The text states that the ion exchange treatment system will remove manganese and reduce total dissolved solids in the ground water. Treatment of other inorganic constituents in excess of ARAR concentrations should be addressed.

Section 4.3.2.1, Page 4-7. Table 3-1.3 of the IM/IRA plan indicates that nitrite, nitrate, sulfate, uranium, and chloride are present in excess of their respective ARARs in the alluvium at OU2. Therefore, base anion exchange in addition to acid cation exchange units will be necessary for removal of these constituents. The subsequent disposal of radioactively contaminated resins (uranium, alpha, and beta emitters) should also be addressed.

Section 4.4.1.1, Page 4-12. This alternative mitigates contaminated ground-water migration by withdrawing ground water containing elevated levels of volatile organic compounds (VOCs) from selected wells. Ground water containing elevated levels of inorganics should be addressed as well.

Table 4-2, Page 4-16. No treatment requirement is listed for metallic strontium, even though Table 3-2-2 on Page 3-15 lists background value as to be considered (TBC) for strontium. A background value of .15 mg/l for strontium is given in Tables 2-7 through 2-12. This level is exceeded in Table 4-2 by the influent low-yield wells and influent well 42-86.

Section 4.4.1.2, Page 4-22, Paragraph 2. This paragraph addresses the effectiveness of the ground-water collection system in removing the contamination from the ground water in OU2. However, the ground-water collection system depicted in Figure 4-4 is not likely to remove or contain contamination from the eastern-most trenches because the ground water from those areas drains to the north or south off this ridge, rather than to the west, toward well 42-86. Thus it would not address all of the criteria for effectiveness evaluation listed on Page 4-2, such as the mitigation of identified threats and the long-term reliability for providing continued protection.

Section 4.4.1.2, Page 4-22. Section 4.4.1.2 states that it is uncertain how effective the ground-water collection system proposed in Alternative 1 will be in containing contaminated ground water at OU2. Estimations on the effectiveness should be prepared (for example, an analysis of the radius of influence expected from pumping the recovery wells).

Table 4-4, Page 4-29. Methods for preparing data in Table 4-4 should be specified.

Table 4-7, Page 4-39. Methods for preparing data provided in Table 4-7 (for example, the number of and spacing between wells, flowrate, and so on) should be specified and qualified. Analysis of the radius of influence of the wells using these data should be provided.

Table 4-9, Page 4-47. Table 4-9 indicates that operation and maintenance (O&M) costs will be the same ($67,000 per year), for each alternative. Alternative 2, the french drain option, should have significantly lower O&M costs compared to the alternatives of low pumping.

Page 5-1, Comparative Analysis of Alternatives - General Comments. Alternative 1, selective pumping of existing monitoring wells, was chosen as the recommended remedial option for its implementability, low cost, and effectiveness in collecting contaminated ground water. This alternative does not, however, effectively contain the migration of contaminated ground water from OU2. Considering the hydrogeologic characteristics present at this site, it appears as if Alternative 2 (french drains), modified to extend downgradient of all potential sources of contamination at OU2, may be the superior method of containing contaminated ground water.

The use of french drains will more effectively collect contaminated water from a greater portion of the total area of contamination rather than a few selected wells (Alternative 1). Table 5-1 indicates that french drains would be only partially effective because (1) a drain at the east trenches cannot be sealed completely due to sandstone subcrops, (2) soils at the 903 Pad are mostly unsaturated, and (3) the extent of contamination is poorly defined at all areas, which makes placement of drains difficult.

Sandstone subcrops can be dealt with by overexcavating and backfilling with compacted clay to the same specifications as the rest of the claystone in the trench bottoms. A french drain system will penetrate some unsaturated areas. However, saturated zones not drained and treated by Alternative 1 would also feed the french drain system making it more effective in removing contaminated ground water. The site's extent of contamination is poorly characterized and is a detriment common to each alternative considered. However, use of the french drain to control virtually all migration of the alluvial ground water will alleviate some of the concerns regarding the lack of a thorough contaminant characterization effort. Furthermore, O&M costs for water are substantially lower using a french drain system.

Section 7.5.1, Page 7-9, Paragraph 2. This paragraph states that there will be little or no potential for workers to contact VOC-contaminated soil during construction of the water treatment facility because the facility will be located on non-VOC-contaminated soil. Soil sampling data should be provided in this section along with some indication of whether the data has been validated.

Section 7.5.2, Page 7-11, Paragraph 2. The statement is made that 0.0002 mrem is the highest effective dose to site workers from all excavation activities during the project. The calculations performed to derive this value should be provided in this section. This value is compared with a 125 mrem average dose from natural background sources. The source of this background value should be referenced.

Section 7.5.3, Page 7-12, Paragraph 2. The statement is made that 0.0003 mrem is the maximum effective dose to a member of the general public from dust generated during construction activities. It is also stated that 0.0006 mrem/yr will be the maximum dose attributed to vehicular traffic. The calculations made to derive these values should be provided in the section.